QCM-RF / 2-18.5 GHz
Qubit Control Module | Cluster Series 19” Rack Mounted

Release April 2023_V1.6.1

Description

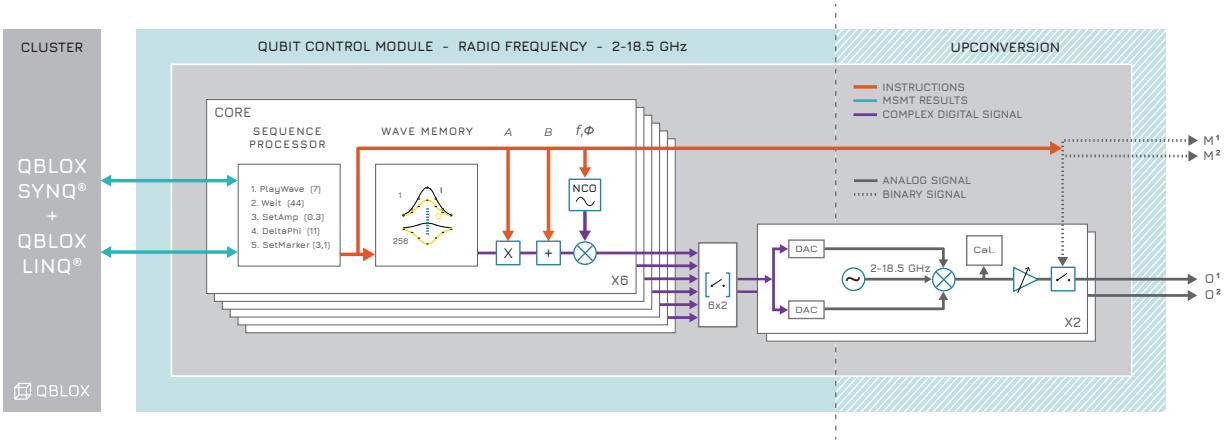
The QCM-RF is the ideal RF signal generator specifically designed for the control of quantum devices. The unleveled noise performance and high spurious-free-dynamic range makes it ideal for high-fidelity single- and two-qubit gates.

The QCM-RF has 2 RF output channels with two independent internal up-conversion stages to directly output signals over a wide frequency range from 2 GHz to 18.5 GHz. The module incorporates 6 sequence processors for flexible multiplexed driving and tracking of up to 6 qubits that can span a 750 MHz band without compromising on its state-of-the-art spurious-free dynamic range of > 50 dB (within the analog bandwidth).

Both output channels have their own local oscillator to allow fully independent operation of each channel.

Features

- Advanced distributed sequence processing.
- Multiplexed control of up to 6 qubits per module.
- Synchronized to all other modules with SYNQ protocol.
- Real-time control of amplitude, offset and modulation phase (virtual Z-gates).
- LINQ allows for low-latency interaction with all other modules within 364 ns.
- Sequencer instructions allow constructing arbitrarily long (modulated) signals.
- External instrument triggering via 2 marker outputs.



Specifications QCM-RF

Frequency range (-3 dB)	2 - 18.5 GHz
Analog output channels	2
Analog bandwidth (-3dB)	750 MHz
DAC sample rate	1 GS/s (for I and Q)
DAC resolution (vertical)	16 bit (for I and Q)
Binary output markers	2 (3.3V LVTTL)
Max. output power (into 50 Ohm)	-40 to +5 dBm (settable)
Spurious-free dynamic range	> 50 dB (within analog bandwidth)
Phase noise (@3 GHz, 10 kHz offset)	-115 dBc/Hz
Frequency resolution	0.25 Hz (IF), 1 Hz (LO)

Output switch signal suppression	>60 dB
Ethernet data rate	1 Gbit/s
Driver/API	SCPI / Python / QCoDeS
Max. power consumption (via Cluster)	48 W
Input/Output connector type	SMA
Marker connector type	SMP
Dimensions single module	269 x 130 x 20 mm³
Weight	0.303 kg

